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Editorial

SMOKING "GUNS"

I have been asked by the Board of Directors and officers of our Society to write an editorial that addresses the issue of laser plume, or more accurately, the hazards of vaporized tissue plume in the operating room environment. Our purpose in bringing this topic to your attention is to provide a synopsis of the problem and convey the sense of our Board and the membership concerning this charged topic.

Anyone who has been in an operating room environment since Bovie's apparatus for hemostasis was promoted by Harvey Cushing and others in 1936, has been exposed to the odors . . . and hazards of vaporized tissue plume. Seemingly little attention was paid to this occupational hazard despite its being right "under our collective noses." Laser plume on the other hand became a more visible issue early on due to the larger volumes of "smoke" generated and the whole aura and mystique associated with "laser surgery." Indeed, the first Stackhouse smoke evacuators came into existence when operating room nurses began to complain about the odor of "laser surgery." "Stack" told me that the device itself was "borrowed" from his successful adaptation of a vacuum cleaner that was modified to exhaust and filter the obnoxious fumes generated during the mixing of bone cement during surgery . . . the result of another complaint on the part of the nursing staff.

The mystique surrounding laser-plume is beginning to reach the doors of Congress due to a variety of lobbyists such as The Coalition for the Protection of Operating Room Personnel and other special interests. Some have implied that lasers are the sole source of the problem. NIOSH/OSHA *does* have current guidelines in existence which "recommend" but do not require that all personnel who are in *any* area where there is exposure or potential exposure to vaporized tissue plume should be protected with filtration devices. Their guidelines stop just short of recommending and/or requiring the use of personal respirators in these environments [1,2].

It is well-recognized by NIOSH/OSHA, other federal agencies, ANSI, ASLMS and others that vaporized tissue plume represents a potential hazard for patients and personnel REGARDLESS of the energy source that produces it. A large body of scientific literature attests to the fact that the plume produced by an electrosurgical unit (ESU, "Bovie" is no different or less hazardous than that produced by laser devices. This issue is addressed in the ANSI standard (ANSI Z 136.3, 1996) [2]. These facts have formed the basis of marketing strategies utilized by the various smoke evacuator manufacturers who have brought this issue to operating room and hospital management recently.

Ott and other investigators [1,3] have demonstrated that both the gaseous and particulate phase effluents of vaporized tissue plume are hazardous and current systems do not adequately filter the gaseous phase components. Recent work has shown that smoke from vaporized tissue presents hazards to the patient undergoing a laparoscopic procedure [1,3]. Several of the gas phase components can be retrieved from the patient's peripheral blood. Such concerns may also be an issue for operating room personnel as many clinicians vent laparoscopic gas directly into the operating room without the use of suction or other devices.

The issue of viable particles in the tissue plume has been hotly debated in the literature. Several members of our Society including Baggish, Garden, Ott, Owen and our own laboratory, have addressed various aspects of vaporized tissue plume. This work has investigated plume and flowing gasses relative to wounds, tissue cultures, recoverable DNA fragments, and other topics. Suffice-it-to-say, the experimental scenario can be organized in such a way as to splatter or blast tissue, which would dramatically increase the likelihood of aerosol formation and enhance the probability that viable material is released in the process. To the best of my understanding, viable virus has only rarely been demonstrated. Portions of viral DNA have been recovered from the plume under certain conditions, without being able to culture virus [4]. LoBraico [5] surveyed 4,500 laser users of whom 824 responded that they treated patients with warts. The respondents re-

ported 26 lesions, of which, only 4 were proven by biopsy to be a wart. One lesion (on the lip of a dermatologist) was proven by serotyping to be identical to the virus producing lesions in her patient. LoBraico's conclusion was that patient to caregiver transmission is at best a rare event and that the majority of cases reported thus far were most likely the result of a breach in technique and self-implantation with virus rather than implantation by contact with the laser plume.

The Laser Safety Committee has reported on the hazards of vaporized tissue plume. The recommendations are as follows:

I. All medical personnel should consider the vaporized tissue plume to be potentially hazardous both in terms of the particulate matter and infectivity.
II. Evacuator suction systems should be used at all times to collect the plume.
   a) The suction should have a high flow volume with frequent filter changes being made to optimize suction and filter capabilities.
   b) Filters should be chosen which allow for maximum filtering efficiency.
   c) The suction tip must be placed as close to laser impact as possible.
   d) Evacuator suction tips should be cleaned (preferably sterilized) after each procedure.
III. Eye protection, masks, gloves, and appropriate clothing should be always worn during laser use by all laser personnel when vaporized tissue plume is generated.
   a) Eye protection should be of a nature which would protect from splatter.
   b) Masks should have good effective filtration.
   c) Gloves should be preferably latex (or an effective substitute in the case of latex sensitivity).

Full copies of the Safety Committee report can be obtained by writing the Central Office.

Our Society's leadership unanimously believes that smoke evacuation apparatus should be provided and utilized in all operating rooms and areas where vaporized tissue is generated, regardless of its source. We as individuals should be vocal advocates of such good practices. We should support national forums that provide rational education on this topic and other issues concerning the operating room environment. It is our collective responsibility to provide meaningful information rather than condoning or supporting the special interest groups and/or vendors that would derive economic benefits from increased regulation based on mass hysteria or scare tactics. Education and safe practice are the best weapon against the smoking gun.

Raymond J. Lanzafame, M.D.
Past President, ASLMS

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